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**Case# 16300932**

**Regina vs. Edward DOWNEY**

Charge: 235(1) CC – First Degree Murder

## **Friction Ridge Analysis Report**

Authored by Constable J. Arns #4223

January 24, 2017



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## What is a fingerprint?

A *fingerprint* is an impression made by the ridges of the skin on a finger or thumb on a surface.

These ridges assist in gripping or obtaining traction. These areas are referred to as friction skin and are found on our hands and feet.



File Image



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Quantitative-Qualitative Friction Ridge Analysis: An Introduction to Basic and Advanced Ridgeology, Ashbaugh, DR.CRC Press, 1999.



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## Types of fingerprints











### Known/ Exemplar:

Fingerprint impression that is deliberately taken for identification or comparison purposes (inked or digitized).


1000131549

**CALGARY POLICE SERVICE**  
#588 - 316 - 7TH Avenue S.E. Calgary, Alberta T2G 0J2

Name DOWNEY, Edward KEY NO. 144431

 1. Right Thumb	 2. Right Forefinger	 3. Right Middle	 4. Right Ring	 5. Right Little
 6. Left Thumb	 7. Left Forefinger	 8. Left Middle	 9. Left Ring	 10. Left Little

PREPARED BY: CALGARY POLICE SERVICE  
IDENTIFICATION SECTION

Taken By ADG/H7158 Date SEP 16 2006  SIGNATURE



Left	Right
	

Image provided by Calgary Police Service



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## Types of fingerprints

### Latent:

Fingerprint impression that is not easily seen by the naked eye and requires development to be visualized.



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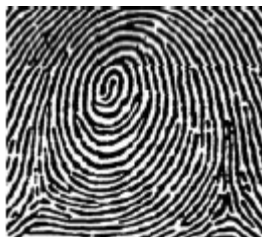




## Premises of friction ridge identification

- **Develop prior to birth:** Friction ridges develop on the fetus in their definitive form prior to birth
- **Persistent:** Friction ridges persist throughout life, except for permanent injury or disease
- **Unique:** Random stresses that influence the development of friction ridges in utero result in friction ridge characteristics that are unique
- **Patterns vary allowing for classification:** 3 common pattern types

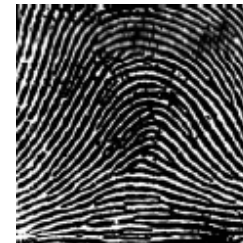
Whorl



Loop



Arch





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## Philosophy of friction ridge identification

*“Friction ridge identification is established through the agreement of friction ridge formations, in sequence, having sufficient uniqueness to individualize.”*



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## ACE-V Methodology

ACE-V methodology is used for friction ridge analysis and consists of:

- 1) **A**nalysis
- 2) **C**omparison
- 3) **E**valuation
- 4) **V**erification

*“ACE is not generally applied as a strictly linear process because it may include a return to any previous phase.”*



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## Analysis

To determine if the impression is suitable for comparison by assessing if there is sufficient quantity and quality of detail in the impression.

If the impression is not suitable for comparison, the examination stops at the analysis phase.





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## Case# 16300932

- Monday, July 11, 2016, Sara Baillie was located deceased within her residence. Baillie's 5 year old daughter was missing, and later located on July 14, also deceased.
- Duct tape removed from the body of Baillie at the time of autopsy was examined for fingerprint evidence
- Three partial latent fingerprints were developed on the sticky side of the duct tape (R1, R2 and R3)



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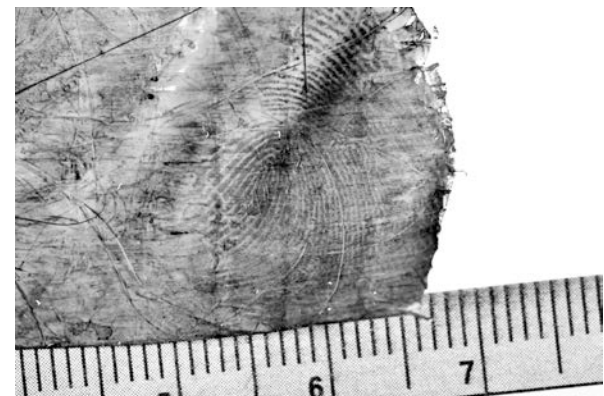
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## Case# 16300932

- An analysis and comparison of R1 and R2 was completed
- Both were individualized as belonging to Edward DOWNEY, AFIS #144431.
- R3 was insufficient for comparison.



Impression R1 is the subject of this report





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## Analysis continued...

Anatomical aspects: how the object was handled and the way the print was deposited.

R1 was located on the sticky side of the duct tape, close to the torn edge.

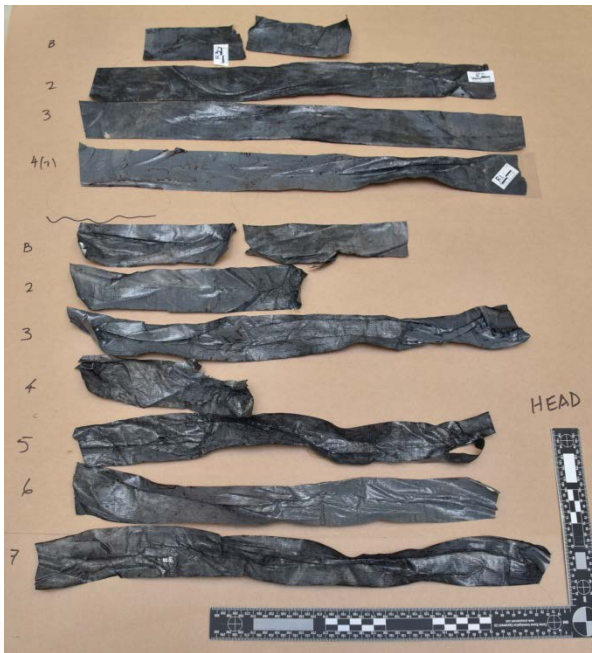






## Analysis continued...

**Substrate:** the type of surface on which the impression was located and how it impacts the appearance of the fingerprint.



### Sticky Side of Duct Tape :

- Non-Porous
- Slightly Textured
- Flexible
- Grey in Color
- Hair Strands stuck on tape



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## Analysis continued...

**Matrix:** what material or medium was deposited on the substrate by the finger e.g. sweat in combination with sebaceous oil, dirt, blood, grease etc.

Latent fingerprints are typically comprised of sweat from the eccrine glands and oils from the sebaceous glands.

In this case the suspected matrix is sweat and sebaceous oils.

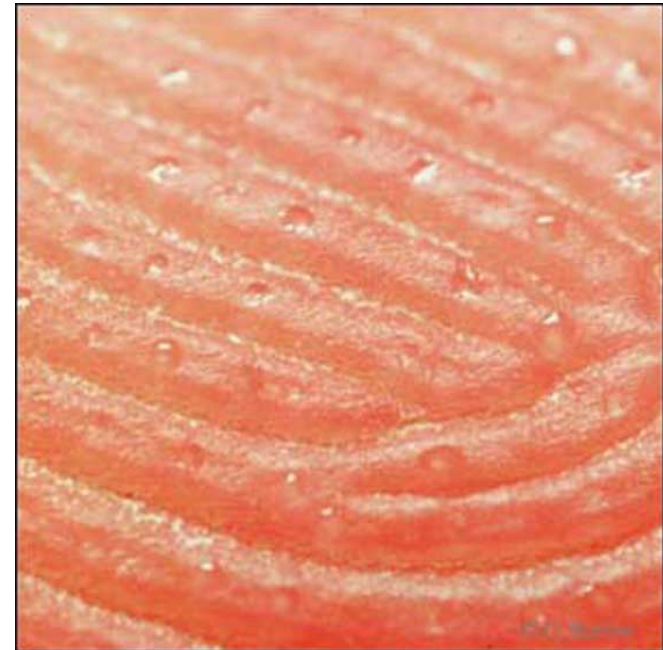


Image provided by google.com



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## Analysis continued...

Development techniques:

- what method was used to make the latent impression visible
- e.g. fingerprint powders, chemicals etc.

## Fingerprint reagents for nonporous surfaces

### Lightning/Liquinox:

This is a paste mixture of lightning black fingerprint powder, a commercial detergent and distilled water which is applied over a surface and then rinsed. The paste reacts with the sebaceous/eccrine oils left behind by fingermarks, and the black powder assists with creating contrast with the lighter grey surface.



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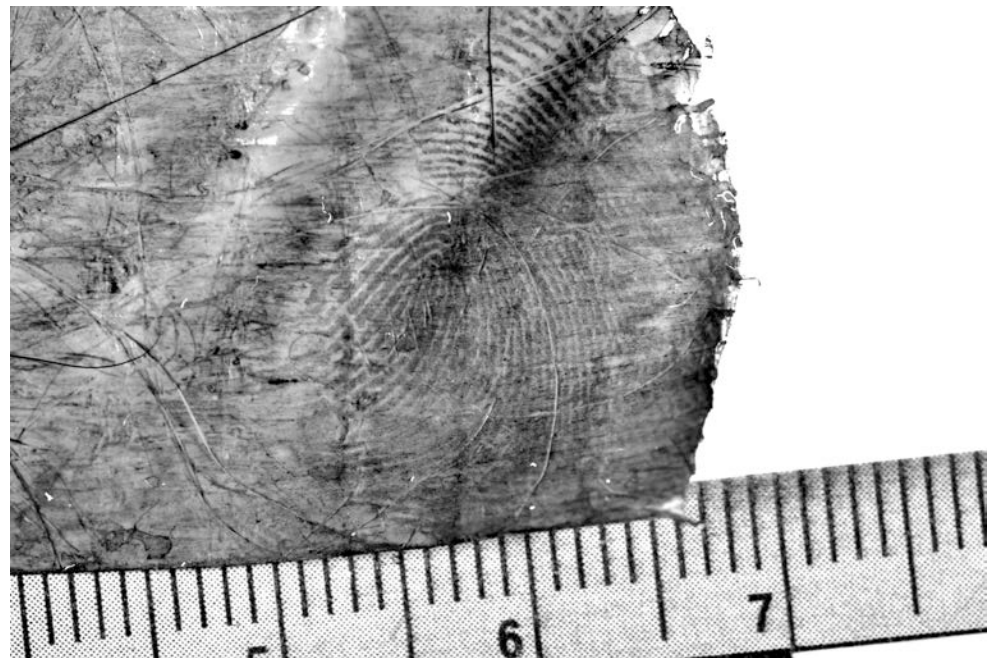
## Analysis continued...

### Deposition pressure:

assessment of downward pressure exerted by the finger on contact with the substrate.

Ridges and furrows will vary in width depending on the amount of pressure exerted at the time of deposition.

Heavier pressure will result in wider ridges, and lighter pressure will result in wider furrows.



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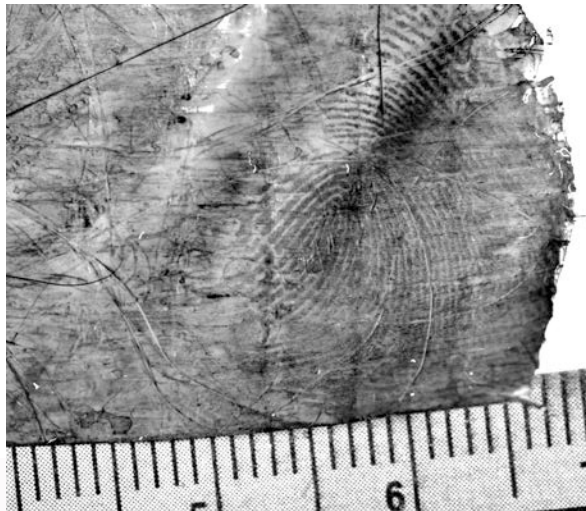


## Analysis continued...

### Lateral/pressure distortion:

assessment of movement of the finger while in contact with the substrate

e.g. twisting motion or slipping



- Some striations are visible on the right portion of the print
- The central core area has a couple of the ridges blending together



## Analysis continued...

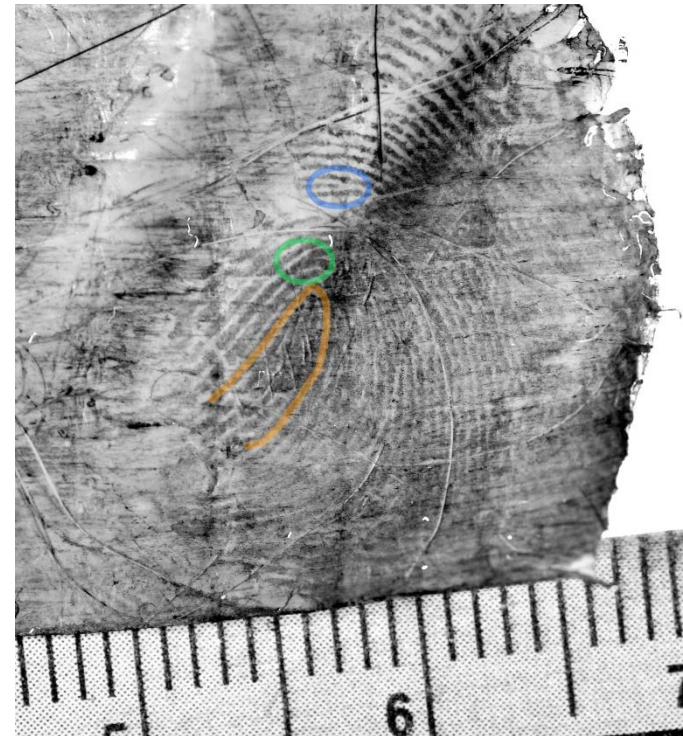
### Levels of detail

#### Level 1:

- overall ridge flow or pattern type
- cannot individualize, but can exclude)
- **Orange** – indicates a loop pattern

#### Level 2:

- specific ridge paths, major ridge path deviations  
(e.g. ridge events, characteristics or minutiae)
- can individualize and exclude
- Ridge Endings (**Blue**); Islands;  
Bifurcations (**Green**); Lakes



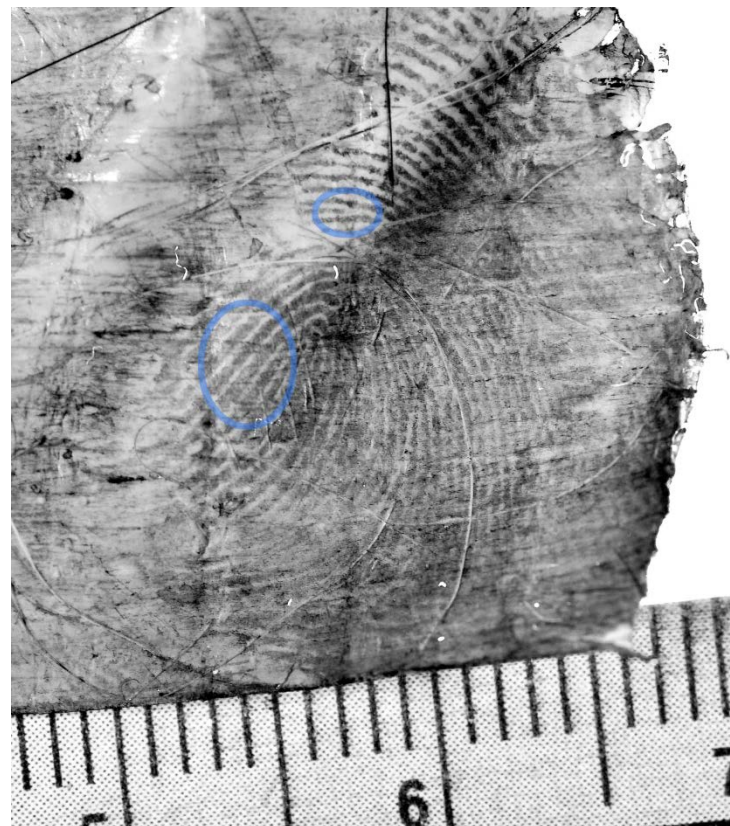




## Analysis continued...

### Levels of detail

**Level 3:** refers to the intrinsic shapes that are present within the friction ridges, the alignment of the ridge units, the shape (thickness/thinness), and pore location. These smaller details found in agreement add to the individualizing power.





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## Analysis continued...

**Clarity:** the visual quality of the friction ridge detail.

### Tolerance for discrepancies:

The examiner assesses the friction ridge features in the impression to determine how much variation is reasonable in appearance and spatial relationships between the known and latent impression.

High quality = lower tolerance for discrepancies

Low quality = higher tolerance for discrepancies



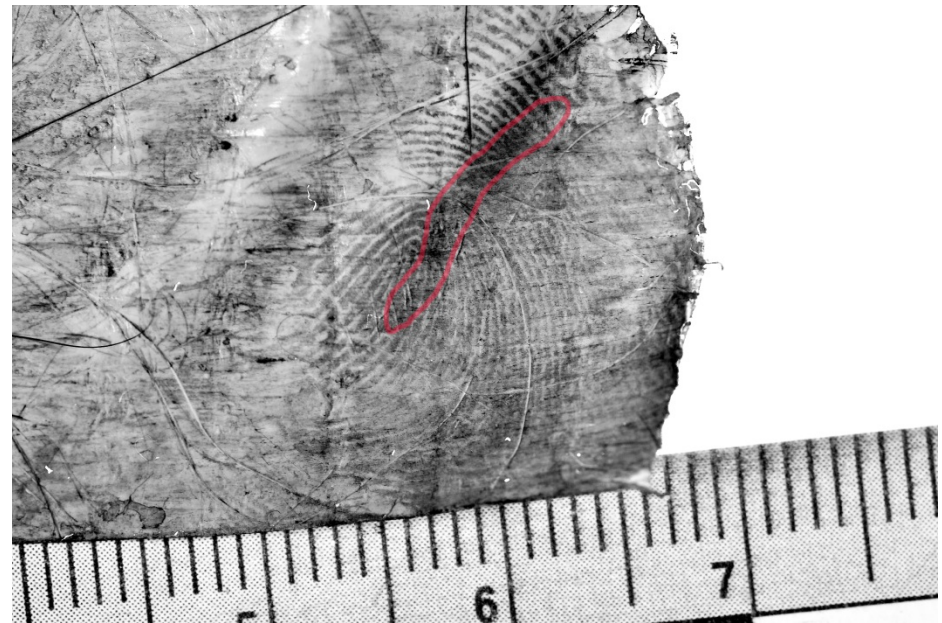
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## Analysis continued...

Areas hi-lighted in **Red** indicate a high tolerance – ridge paths are hard to follow.

Ridges to the left of the core are low tolerance – meaning the friction ridges can be followed with ease. Ridges to the right of the core are a medium tolerance as the area displays lateral distortion, however ridges can be followed.







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## Comparison

A comparison is completed by comparing ridges on the unknown fingerprint to the known fingerprint.

A sequential ridge to ridge comparison is accomplished through side-by-side observations of all available levels of details.



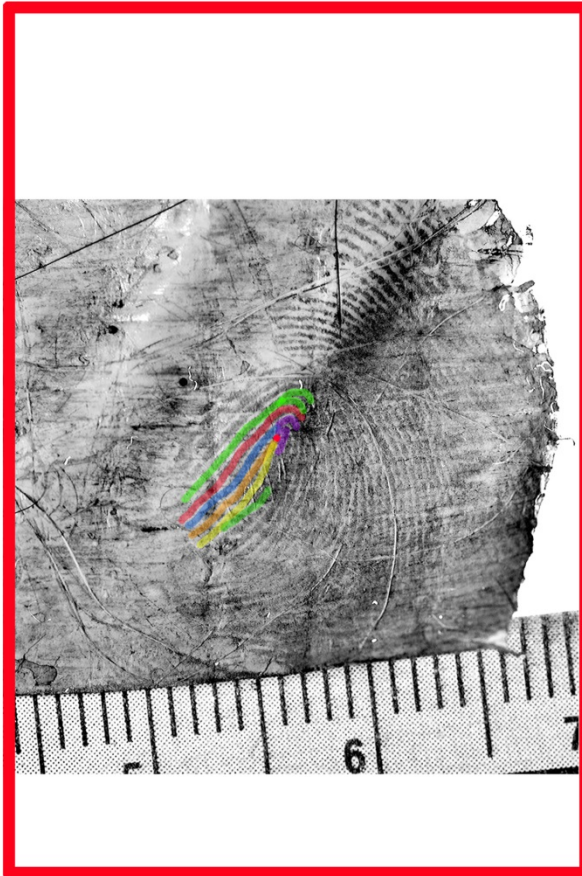
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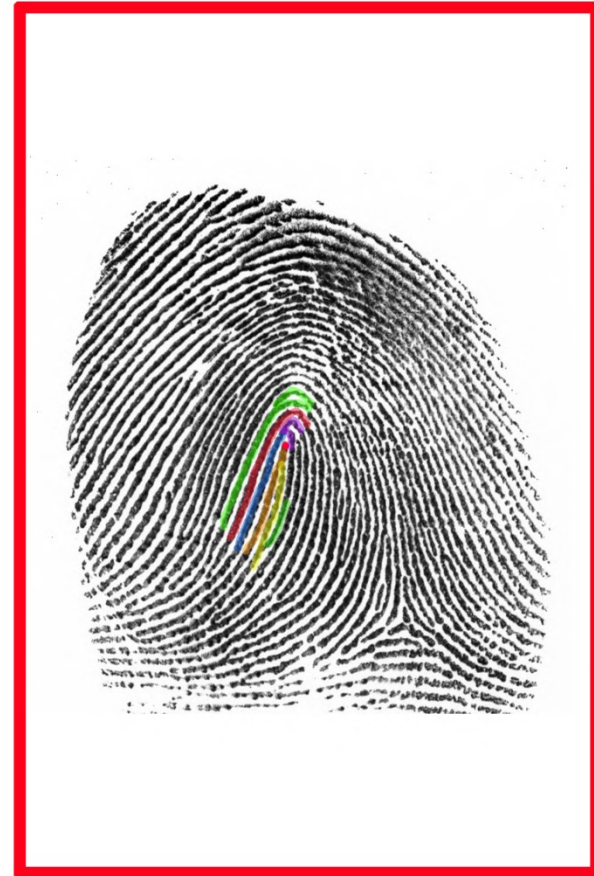
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Comparison continued...



Unknown



Known



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## Evaluation

A quantitative and qualitative evaluation to determine if there is agreement of the friction ridge formations, in sequence, having sufficient uniqueness to individualize.

The outcome of the evaluation is one of the following standard conclusions.

**Identification/ individualization:** same source.

**Exclusion:** not the same source.

**Inconclusive:** unable to individualize or exclude as being from the same source.



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## Individualization/ identification

*“Individualization of an impression to one source is the decision that the likelihood the impression was made by another (different) source is so remote that it is considered a practical impossibility.”*

The impression R1 was individualized to the known impression of the Left Forefinger of Edward Downey, AFIS# 144431. The comparison was conducted by Constable J. Arns #4223.



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## Verification

The verification stage requires an independent examination by a qualified examiner.

Verification of findings is a standard scientific procedure.

Constable D. Mealings #4235 conducted a blind analysis and individualized R1 as belonging to Edward Downey.



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This report was completed by:

Constable J. Arns #4223  
Calgary Police Service  
Forensic Crime Scenes Unit